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USSR Report

ECONOMIC AFFAIRS

(FOUO 3/80)



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MILITARY BUDGETS: SOVIET AND U.S. BUDGETS CONTRASTED

Moscow EKONOMICHESKIYE VOPROSY in Russian No 10, Oct 79 signed to press
24 Sep 79 pp 126-128

[Article in response to reader's inquiry: "Military Budgets: Reflection
of a Socioeconomic System"]

[Text] Lieutenant Colonel V. Deynega, Candidate of Economic
Sciences, responds to the question of how the Soviet
Union is able to maintain its military potential at a
level which is not below that of the US if, with refer-
ence to their amounts, the USSR's allocations for defense
are smaller than those provided for the American military
budget.

In order to insure their security, the USSR and the other countries of the
socialist commonwealth are forced to allocate part of the state budget for
defense needs. In 1979, these expenditures are totaling 17.23 billion
rubles.¹ They have remained virtually constant (1970--17.9 billion rubles;
1975 and 1976--17.4 billion; 1977 and 1978--17.2 billion rubles annually).
The US presents a different picture. Department of Defense² military budget
expenditures here increased from 46.0 billion in 1965 to 107.7 billion
dollars in 1978, that is, by more than 2.3-fold.³ The expenditures portion
of the American draft military budget should total 125.8 billion dollars in
1980 and, as American experts anticipate, should reach 168.9 billion dollars
by 1984.⁴

Comparison of the USSR's defense allocations and the US Defense Department
budget (taking into consideration the relationship between the Soviet
ruble and the US dollar) shows that with respect to volume, the American
military budget considerably exceeds the Soviet Union's budgetary alloca-
tions for defense. There is at the same time a recognition of the existence
of a military parity between the USSR and the US, that is, of a rough
balance of the forces of both powers in the military sphere. There appears
at first glance to be a contradiction here: with our total military appro-
priations considerably below those of the United States, how can we be on
roughly the same level with them in actual military strength?

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Imperialist propaganda, now openly joined by that of the Beijing chauvinists and aggressors, is employing this apparent contradiction in its intensified propagation of the lie alleging that the USSR's actual military appropriations are higher than those officially stated and even exceed American appropriations.⁵ The purpose behind these statements is to be found wholly contained within the overall approach taken by anti-Soviet propaganda, which consists in poisoning the people's consciousness "by slandering Soviet activities, blackening socialism, embellishing imperialism and its predatory and inhuman policy and practice,"⁶ creating a new cover for another round in the arms race and in diverting the attention of the peoples of the capitalist countries from pressing social problems. As is the case with other inventions of this sort, attempts to cast doubt on the data on appropriations for defense needs given in our state budget are absolutely baseless. In actual fact, things are quite different, in consequences of which the contradiction about which we were speaking is indeed only apparent.

It is, of course, true that the absolute amounts and the dynamics of military expenditures as expressed in monetary terms provide a general idea of the character of a country's military activities. But a country's military power and the combat readiness of its armed forces depend not only on the volume of its military appropriations. Playing the most important roles in this instance are a country's sociopolitical system and the purpose behind and the character of the utilization of military appropriations as determined by the economic relationships prevailing within a given country.

The essential difference between the amounts contained in the US military budget and the USSR's defense appropriations⁷ is to be explained primarily by a fundamental difference between the two antithetical socioeconomic systems and, consequently, between their political courses. If a policy of aggression and military preparations and threats are organically, inherently characteristic of monopoly capital, then inherently characteristic of the socialist system is a policy of peaceful coexistence and friendship between peoples safeguarding their labor in the name of peace and providing thereby an ever fuller revelation before all mankind of the fundamental, objective superiority of socialism. It would be useful to emphasize in this connection that it costs less to maintain armed forces which are defensive in character than those which have aggressive plans.⁸

We should also keep in mind that, in addition to preparing for aggressive activities on a global scale, the US is continuously preparing and carrying local military actions involving enormous expenditures for military needs. On the basis of the criteria of a state's involvement in aggression adopted by the UN General Assembly, it has been calculated that in 115 local wars unleashed or provoked by imperialism during the period 1945-1977 the US has acted in the role of a principal aggressor or of an accomplice 101 times (including 31 times as the leading aggressor). American imperialism's role as an accomplice in aggression has taken the form of assistance rendered to a direct aggressor in weapons, mercenary forces,

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military advisors and instructors and money.⁹ US imperialism continues to play the role of an initiator of military adventures. Providing clear evidence of this are the plans developed by the Pentagon for strengthening the United States' "military presence" in the Near East, plans which provide for the employment of American armed forces to seize oilfields in the Arab countries.

The following facts, among others, can testify to the importance of local wars as stimulants to the growth of military expenditures. Over the period covered by the war in Korea, the US Department of Defense Budget increased from 12.4 billion (1950) to 50.4 billion dollars (1953).¹⁰ During the war in Vietnam, the American military budget grew from 46.0 billion (1965) to 77.9 billion dollars (1969).¹¹ According to calculations by the American economist T. Riddel, total US expenditures for waging the war in Vietnam totaled 676 billion dollars (which includes financial outlays directly for the war, the cost of military assistance to its allies in aggression, the government debt accumulated in connection with the conduct of the war and payments to veterans, which will continue over a long period of time to come).¹² With respect to its financial cost, the war the US waged in Vietnam is entirely comparable with American participation in the Second World War: on the basis of rough calculations, the latter cost the US 530.3 billion dollars.¹³ These figures do not take into consideration the difference in the purchasing power of the dollar in the periods of the wars concerned; on the whole, they nevertheless give some idea of the exceptionally high level of expenditure required for imperialism's present conduct of local wars. These expenditures understandably introduce very serious correctives into any comparison of total military appropriations on the one hand and the countries' actual military strength on the other. It is entirely clear that the country which is not waging local wars will be able to achieve equivalent military power with much smaller expenditures of resources.

Yet another very important circumstance consists in the fact that the US military budget is also increasing under the impact of expenditures connected with the maintenance and operation of the enormous network of military bases with which American imperialism has enveloped the globe. The US disposed in 1975 of 429 large and 2297 small military bases in 27 countries covering a total area of more than 10 thousand square kilometers.¹⁴ According to some information, the number of these bases has now been somewhat reduced, but not to the extent that we could speak of any changes in the basic state of affairs.

The Soviet Union has no such military bases; it is therefore not forced to expend enormous amounts of financial resources to maintain them.

The US military budget is in character, therefore, an aggressive budget. So in terms of both its essential nature and its volumes of expenditures, it is precisely this factor which defines its difference from the appropriations allocated for defense in the USSR.

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A more detailed analysis of the problem under consideration also requires consideration of the character of the utilization, or materilization, of budgeted funds. We should single out a least two points in this connection.

1. The purchase of military weapons and equipment is the most important item in a military budget; this accounts for almost one-third of the US military budget. Primarily engaged in arms production in this country are the military-industrial monopolies, the consumer of whose products is the bourgeois state and its armed forces. On the basis of common interests and economic and political goals, the military-industrial corporations and the US government bureaucracy have come together in the so-called military-industrial complex. It has created exceptionally favorable conditions for the military-industrial monopolies to enrich themselves and plunder the state's resources. According to data assembled by a US Senate commission, the rate of profit for 164 of 169 American military-industrial corporations is running from 50 to 200 percent, more than 500 percent in the case of 3 corporations and over 2000 percent for one.¹⁵ The profitability of American military-industrial monopolies is on the average 50-60 percent higher than it is in industries engaged in production for peaceful purposes.¹⁶

Nothing of the kind occurs, nor could it occur, in the Soviet Union or any other socialist country. Our government makes its military production decisions in a tightly controlled manner in strict accordance with prescribed procedures, insuring thereby the most efficient utilization of material, financial and labor resources and reducing the cost of arms. This was in particular very clearly demonstrated during the Great Patriotic War, when, at the call of the Party and on the initiative of the workers in defense industry enterprises, there developed the All-Union socialist competition for the best fulfillment of orders and requests from the front, for the mobilization of internal production resources, for the achievement of economies in raw material consumption and for reducing the cost of production.

2. The fact has to be taken into consideration that, as opposed to the Soviet Union, where the armed forces are established on the basis of a universal military service obligation, the US has a hired army; and the pay and support for personnel require substantial expenditures. Approximately 50 percent of the military budget will be allocated for these purposes each year through 1985.¹⁷

Without taking these circumstances into consideration it would of course be impossible to draw even a rough comparison between Soviet and US military expenditures.

"We spend for defense as much as is absolutely necessary. No more, no less. In accordance with what is required by the situation."¹⁸ So the socialist social system creates the objective conditions required for the efficient and effective accomplishment of defense tasks and permits the Soviet Union reliably to provide for its security while at the same time spending a substantially smaller portion of its national income for military purposes than the US.

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FOOTNOTES

1. See "The Law of the Union of Soviet Socialist Republics Governing the State Budget of the USSR for 1979," PRAVDA, 1 December 1978.
2. Capitalist governments channel substantial sums toward utilization for military purposes through other items in their state budgets in addition to those in the budgets of the individual military ministries. In the US they are channeled through the Department of Energy, The National Aeronautics and Space Administration (NASA) and other agencies.
3. See "Statistical Abstract of the United States," Washington, 1976, p 327; "Special Analyses Budget of the United States Government. Fiscal Year 1979," Washington, 1978, p 12.
4. See "The Budget of the United States Government: Fiscal Year 1979," Washington, 1979, pp 50, 568.
5. See "The Military Balance 1977-1978," 1977, pp 10-11.
6. "Further Improvement of Ideological and Political Indoctrination Work." Decree of the CPSU Central Committee, 26 April 1979. Moscow, 1979, p 6.
7. It should be borne in mind that we can draw only a rough comparison between them, since the military budgets of different states, particularly in the case of those part of opposing social systems, are not structured in the same matter.
8. For details see NOVOYE VREMYA, No 2, 1979, p 31.
9. See H. Rennhack, "Timetable for Armed Imperialist Aggression Since 1945," MILITARWESSEN, No 12, 1977, pp 96-99.
10. See "Statistical Abstract of the United States," Washington, 1975, p 314; "The Economics of Defense Spending," Department of Defense, Washington, 1972, p 8.
11. See "Statistical Abstract of the United States," Washington, 1975, p 316.
12. See S. Melman. "The Permanent War Economy: American Capitalism in Decline," New York, 1974, p 66.
13. See "Statistical Abstract of the United States," Washington, 1976, p 329.
14. See L. M. Gromov and R. A. Faramazyan, "Voyennaya ekonomika sovremennogo kapitalizma" [The Military Economy of Modern Capitalism], Moscow, Voenizdat, 1975, p 25.

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15. See PRAVDA, 15 November 1977, p 5.
16. See NOVOYE VREMYA, No 2, 1979, p 31.
17. See "Defense Manpower: The Keystone of National Security. Report to the President and the Congress," Defense Manpower Commission, Washington, 1976, p 35.
18. L. I. Brezhnev, "In the Name of the Happiness of the Soviet Peoples. Speech Delivered at a Meeting with Voters of Moscow's Bauman Electoral District, 2 March 1979," Moscow, 1979, p 10.

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ROLE OF NEW TECHNOLOGY ASSESSED IN RELATION TO SOCIAL, ECONOMIC PROGRESS

Moscow VOPROSY EKONOMIKI in Russian No 11, Nov 79 pp 120-129

[Article by M. Vilenskiy and V. Fel'zenbaum: "The Social and Economic Effectiveness of New Technology"]

[Text] The economic strategy of the Communist Party and Soviet government is directed to the accomplishment of a group of social and economic tasks as set forth by the party program and the recent congresses: further enhancement of the welfare of the Soviet people, improvement of their labor and living conditions, and substantial progress in public health care, education and culture. These tasks, which promote all-round development of personality and improvement of the socialist way of life, are assured of successful accomplishment by the growing economic potential of our society and the strengthened social orientation of the national economy management.

The state plans for development of the national economy have come to be integrated plans for economic and social development, as stated in the USSR Constitution. The CPSU Central Committee and USSR Council of Ministers decree on "Improving the planning and intensifying the impact of the economic mechanism in increasing the efficiency of production and the quality of the work" stipulates that in these plans for all levels there should be prepared composite sections pertaining to a whole complex of measures in the area of social development, these to be coordinated with the tasks for the development of production and capital construction and for increasing their effectiveness. The development of a comprehensive program for scientific-technical progress has become the most important element in the planning process. On the basis of the requirements of social hygiene we are expanding our regulation of the labor and living conditions of the population and the character of the environment.

This strategy is also the basis for the formulation of a technical policy which provides for the solution of the economic and social problems. Discussing the aims of the technical policy, A. N. Kosygin declares: "We must at the same time strengthen the social orientation of scientific-technical progress, which entails as one of its most important tasks the creation of the necessary preconditions for improvement of the conditions

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"of labor and structuring of labor's creative content in accordance with the developing educational and vocational training of the workers."¹ Among the five first-priority national economic programs designated in the new decree was one declaring it necessary to develop a program for cutting down the use of manual labor.

Strengthening the social orientation of scientific-technical progress dictates the urgent need to evaluate the introduction of the achievements of science and technology in the national economy on the basis of the indicators for social and economic effectiveness because it is the increase in social and economic effectiveness which is the final result. For achievement of this result we must orient the management of technical progress in genuinely meaningful fashion. The new technology is evaluated on the basis of the extent of its contribution to the task of fuller satisfaction of the material and spiritual requirements of the workers, to the maintenance of their health, and to the harmonious development of their personality, that is, in accordance with the requirements primarily of the basic economic law of socialism.

The category of social and economic effectiveness of new technology is a specific category of the socialist mode of production. It is a comprehensive category which embraces the economic and social aspects of the development and application of new technology in their unified form and in their interrelationships. Very great methodological importance attaches to V. I. Lenin's thesis, which was criticized by Struve and Tugan-Baranovskiy, who set the economic off against the social. He [Lenin] wrote: "I am utterly at a loss to understand what meaning such a differentiation can have, how the economic can be extraneous to the social."²

The new technology, which is increasing the productivity of national labor, is enabling us to produce more and more of the material goods needed by society and to effect a saving of living and embodied labor. It is in this that we find a manifestation of its economic effect. At the same time, in insuring production of an ever greater quantity of material goods the new technology thereby helps to escalate the living standard of the workers, that is, helps in the solution of an important social problem. In addition, the living and embodied labor saved can be applied to expansion of production of an additional quantity of material or spiritual goods, which, of course, helps to further enhance the living standard of the workers. Said L. I. Brezhnev at the 25th CPSU Congress: "It is after all the growth of production, the increase of production output, and the improvement of its quality which constitute the chief and decisive condition for enhancement of the people's welfare."

Thus, the national economic saving attributable to the new technology is the source of the achievement of social results. This is one aspect of the matter. On the other hand, the new technology is expected to provide for improvement of the conditions of labor, making this labor less arduous, enhancing its creative character, reducing environmental pollution, and

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bettering the living conditions of the population so as to free it from expenditures of time which serve no purpose in the development of personality. Use of the new technology makes it possible to prevent some of the people's diseases and increases the effectiveness of the treatment of other illnesses. All these consequences of the use of the new technology constitute its direct social results.

As a rule, regardless of what concrete types of equipment have been employed to achieve such results, the achievement, in a reverse relationship, has an enormous impact on the economic system. While providing for the health and working capacity of the individual, the social results of the introduction of new technical findings, both in physical production and in the nonproduction sphere (public health, everyday life, realm of services, passenger transport, etc.) increase the labor productivity of this individual. "In the new five-year plan the role of social factors in the development of production and in increasing production efficiency is growing apace," said A. N. Kosygin at the 25th CPSU Congress. "The level of skill of the personnel, a businesslike and creative situation, and a healthful social and psychological climate in the collective, concern for the living conditions of the workers, establishment of cultural institutions and sports complexes in the enterprises--all this makes the life of the individual more interesting and more meaningful and has a favorable effect on the results of production."

We are now compiling concrete figures on the saving of national labor obtained through the social results of the introduction of new technology in the various spheres of national production. All this is enabling us to talk about the economic manifestation of the social results of new technology. Of course, the social results themselves are not applied to this economic evaluation of them. As concrete useful factors, they retain their independent significance and are measured by their own distinctive physical indicators. Thus, the social results of the introduction of equipment and technology which improve the conditions of labor (cutting down the vibration of the implements of labor and the amount of noise, normalizing the temperature regime in the production spaces, stepping up the level of labor safety) are manifested in reduction of the incidence of occupational and general diseases and occupational injuries and reduced personnel turnover. In addition,--and this is extremely important--the social results of the introduction of new equipment and technology in the field of physical production and in economic services, generating a change in the content of labor, can be measured by such indicators as escalation of the general educational and vocational level of the workers, reduction of the proportion of manual labor, progressive changes in the occupational composition of the personnel, etc.

The social results of the introduction of new techniques in the realm of services (public health, let us say) can be measured by a whole complex of physical indicators such as, for example, elimination of infectious diseases, reduction of infant mortality and lengthened life span, reduction of the

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time of hospital and out-patient treatment of general diseases, etc. The social results of the introduction of new techniques in the realm of education can be determined by indicators of progress of pupils, reduction of the periods of instruction, etc. In addition, the social results of the introduction of new techniques in the everyday life of the population can be measured by indicators for reduction of time spent on household chores and increase in free time. Finally, the social results of the introduction of special technology to protect the environment against pollutants, results which are manifested in the reduction of discharges into the atmosphere and water reservoirs of noxious substances containing flue and exhaust gases and waste waters--these results can be measured by indicators for the reduction of incidence of illness in the population residing in the zones of pollution, increase of productivity in the industries which use water in their technological processes, and reduction of corrosion in the machines, equipment, buildings and installations which operate in the zone of pollution.

To be sure, the economic manifestation of some of the social results of the application of new technology do not to any extent reflect their comparative importance as goods. For example, the economic rating of new medical techniques may in some instances be low. However, this does not define their social significance. The development of technology which will insure increased social results generally requires large expenditures. Consequently, in every specific period society proceeds from the economic potentialities when corroborating the norms for the conditions of life and labor of the population, the maximum permissible concentrations of noxious substances in the air, water and soil, and other social standards. This means that the social results of scientific-technical progress depend on the economic potential which, in addition to everything else, evolves both from the cost savings obtained from replacing obsolete models of equipment with new ones and from the impact (in a reciprocal relationship) of the already achieved level of norms on the economic system.

These are the different aspects of the category of social and economic effectiveness of new technology. How is this category to be defined in brief terms? In its broad sense effectiveness is contained in the contribution which a particular social phenomenon or a particular administrative compartment makes to realization of the goal of socialist society as set forth in its basic economic law. In the narrower sense effectiveness of new technology is defined as the correlation between the results of its use and the costs entailed in obtaining these results.

The result of the use of new technology can be called social and economic since it consists of two inseparably linked components--the increase through it of the production of the material, goods and services needed by society (the economic component) and the improvement of the conditions of labor or mode of life of the individual (the immediate social component). Consequently, the concept of social and economic effectiveness of new technology connotes the correlation between its social and economic result and the

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expenditures made for achieving this result. Since the social and economic result represents an aggregate of various material and spiritual goods useful to man, they, like the various use values, are not reduced to a single indicator. Hence, neither is the correlation between the social and economic result and the costs reduced to the very simple operation of dividing one quantity by another.

The change to control of scientific-technical progress on the basis of an evaluation of the effectiveness of the new technology required the solution of a number of new and complex methodologic^{al} problems and the development of special methods of determining the social and economic effectiveness of the new technology. A plan for these methods was prepared in the Institute of Economics, AN [Academy of Sciences] USSR. It is first of all necessary to distinguish two classes of tasks in determining the social and economic effectiveness of the new technology: (1) selection of the best variant of the new technology, one which will lead to achievement of the assigned social and economic results, and (2) evaluation of the impact of the assigned social and economic results on every phase of the process of reproduction of material and spiritual wealth (that is, production, distribution, exchange and consumption). In literature this kind of evaluation has been designated estimates of "loss averted."

The tasks belonging to the first class stem from the need to select a specific variant of the new technology, one which will insure the optimum social and economic effect and serve the need for planning and estimating this effect in price fixing as well as the need to stimulate the development and introduction of such technology. The tasks belonging to the second class pertain to the need to justify the projected social and economic results, to determine the amounts of material and financial resources in the national economy at the time when these results are achieved, and the need to take these resources into account in the planning; also, the need to determine the overall (absolute) economic effectiveness of the capital investments in the socially oriented technology on the level of the regions or the national economy as a whole. As we see, these are tasks of varying purpose and hence the methods of accomplishing them are also varied.

The methods of accomplishing the tasks belonging to the first class are based on the theory of comparative effectiveness of the capital investments and the new technology. However, they are modified and complicated by the need to allow for the specific character of the social and economic result. The best technology variant is selected on the basis of maximum national economic and social economic effectiveness. This latter comprises an increase in the social and economic result and a saving in the expenditures for obtaining this result in comparison with the result that could be obtained with the old (supplanted) technology. It is true that the new grain harvesting combine model, with the same longevity and a productivity 50 percent greater than the former (supplanted) one, attains a 30 percent reduction of vibration and has transmission guard panels. But, to the

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costs of production of the former model, apart from the 1.5-fold increase in the productivity coefficient, we would have to add the costs for elimination of vibration in the same range and for installation of these panels in the course of use of the model to be replaced.

Thus, the calculation of the social and economic effect is carried out with adherence to one of the fundamental principles of the theory of comparative effectiveness--comparison of the useful result in its real and physical form. The matter is complicated by the fact that if the calculation of the economic effectiveness of the variant to be replaced entails a comparison with the new variant according to one-two parameters, as for example according to productivity (as in the cited example), then determination of the social and economic effectiveness must involve comparison according to a great many parameters. Comparing the social and economic results makes it possible, in calculating the national economic and social economic effectiveness, to apply in principle the customary formulas for determining economic effectiveness through use of the norm of comparative effectiveness.

The national economic and social economic effect shows what social and economic gain accrues to the national economy as a result of the production and use of the new equipment. The cost accounting social and economic effect is the economic benefit (when the established social standards are maintained) in terms of the production and economic activity indicators obtained by the enterprise manufacturing the new equipment (the operational effect for the manufacturer) and the enterprise which uses it in its work. In operational practice the national economic and social economic effect of the new technology is realized through the operational effects. However, when we shift from the category of economic effect to the category of social economic, the mechanism for tying them together and coordinating them becomes complicated.

The following should be considered as belonging under social and economic effect of new equipment, which effect insures attainment of the social norms: for the manufacturer the net profit derived from production of the new equipment and for the consumer the increase of net profit with use of the new equipment as compared to the equipment it is replacing. Both these indicators are obtained after deducting from the gross profit or from its increase all the payments to the budget and payments for violation of the established social standards for environmental protection. The question arises: Can net profit or its increase qualify as a social economic (and not a purely economic) effect? If the prices for the new equipment make up for the expenditures for social needs entailed in its manufacture, if they take into account the social and economic effect for the consumer, and if the cost accounting is carried out strictly within the context of adherence to the social standards and norms, then the question brought up here can be answered in the affirmative. It is also desirable to introduce this procedure in order to insure that from the volume of output sold and profit realized there is fully excluded the portion obtained in consequence

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of the idleness of the technical labor safety devices and environmental protection facilities currently in operation. This would keep some enterprises from attempting to obtain the operational effect through violation of the social standards. For example, in some metallurgical plants on the night shifts they disconnect the gas-trapping units in order to increase the productivity of the blast furnaces even though the "excretion" from the furnace also increases drastically and exceeds the maximum permissible discharges.

The use of the new equipment designed for improvement of the conditions of labor and the use of the ecological technology have a different impact on the enterprise's cost accounting. When expending funds for the special equipment which improves the labor conditions, the enterprise generally obtains an operational effect. The use of this equipment does indeed facilitate the labor, prevent accidents and occupational diseases, and generate a reduction of personnel turnover. This in turn leads to a stepping up of labor productivity at this enterprise, reduces the cost of production, increases the amount of the profit, and, in addition, reduces society's expenditures for medical treatment.

Unlike the production medium, which is limited to the confines of an individual enterprise, the surroundings are, of course, not locked in by such boundaries and are common to a great many enterprises of the particular region. Consequently, the equipment used in a specific production project, when it pollutes the environment, usually inflicts losses on other production facilities located in this region and also on the population residing there. When it builds purification installations or various filters, the enterprise does not increase the production volume or the labor productivity and it does not reduce its production costs. On the contrary, it incurs additional expenses for the operation of all this equipment and this has an adverse effect on its cost accounting indicators. The national economy as a whole benefits from the introduction of new ecological technology. The operational effect accrues to the enterprises which previously suffered from these pollutants. This conflict between the operational interests of the enterprise which pollutes the environment and the enterprise which makes use of the natural resources must be eliminated with the help of a compensating mechanism and a strengthening of the planning methods of management.

The change to calculation of the social and economic effect of the new technology enables us to make corrections in the determination of the content of the new technology as established in economic science and operational practice: it should connote technology which embodies the results of the scientific discoveries and inventions and which by its use provides for obtaining a national economic and social economic effect. However, the determination of social and economic effectiveness as bases for the control of scientific-technical progress pertains not only to the new technology but also to all progressive technology. The concept "progressive technology" is broader than the concept "new technology." Along with the

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development and introduction of new technology based on fundamentally new technological characteristics resulting from scientific discoveries and inventions, there is carried out systematic improvement of the technology based on known traditional technological principles. If the possibilities of applying these principles have not yet been exhausted, then this technology, as does the new technology, provides for the achievement of a social and economic effect and should therefore be considered progressive.

That is the way it is in regard to determination of the national economic and social economic effect of new technology and its reflection in the cost accounting of the enterprises. A different situation is entailed in accomplishment of the tasks of the second class--determination of the various types of savings obtained in society (in physical production, in the nonproduction category, in housework) in consequence of the achievement of the assigned social and economic result. These tasks are accomplished through the methods of determining the general (absolute) effectiveness of the capital investments and the new technology. Since, owing to the use of equalized variants in the comparison, the tasks of the previous type generate the same degree of accomplishment of this result, the impact of this result on the economic system is not dependent on the kind of technology with which the result is achieved. A characteristic feature of the tasks of the second class is that they are accomplished without regard to the rules for identity of useful result and are therefore free of the requirements of the methods of comparing the technology being replaced with the new technology.

As a basis for measuring the impact of the social and economic result on the reproduction process we take the benefit derived from the prevention or elimination of the adverse social consequences which manifested themselves as a result of the operation of the technology in the national economy at a particular time. This impact has many forms. Thus, a reduction in the amounts of discharge of sulfur dioxide at the thermal electric power stations reduces the incidence of sickness in the people who reside in the neighboring regions (this leads to an increase in their labor productivity and a reduction of expenditures for medical treatment), retards corrosion of the metal products in this region, helps to preserve the forest resources, etc.

The varied character of the economic manifestations of the achievement of the assigned social and economic result predetermines the need for measuring these manifestations by means of a system of physical and value indicators of which only the uniform value indicators are summed up. The stepped up social and economic result, which makes for an improvement in the production environment, enables us, on the basis of reports or special observations, to calculate how much of an increase was made in output production, how much of a reduction was made in the payments from the fund for social insurance and permanent and temporary disability, how much was saved as a result of the reduction in the number of accidents and occupational illnesses, how the expenditures for the training of personnel were reduced

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because of this, etc. With improvement of the environmental protection there emerges the possibility of determining the increase in output production both in the polluting enterprise itself (because of the reduction in amounts of discharge) and in other enterprises of this region and the reduction in expenditures of raw material (again in consequence of the reduction of discharges) and in costs for the repair and painting of equipment and metal structures.

As we noted, the uniform indicators can be summed up for all the technical measures; this makes possible their subsequent use in economic analysis. Thus, on the basis of the summation of the additional production increases resulting from implementation of all the measures for environmental protection it would be possible to derive the aggregate growth of national income and then apply this to the costs for environmental protection. We will thereby obtain the coefficient of the general (absolute) effectiveness of the capital investments for environmental protection. By amassing this data we can make use of it in our planning in the future so as to obtain increased yield from these investments.

The social results of the new technology can be useful (positive) or harmful (negative) for the individual and society. Where the positive social results are an important factor in enhancing the economic effectiveness of production, the negative ones usually directly curtail or deter realization of the potential for growth of this effectiveness.

Scientific-technical progress generates new needs on the part of the individual and at the same time creates the material conditions for satisfying these needs. It creates the conditions for full mechanization and automation of the production processes, thereby freeing the workers from laborious and monotonous operations. It eliminates heavy physical labor, increases the degree of "intellectualism" in labor and makes it more attractive. The content of the mental work is also changed--the introduction of electronic equipment relieves the individual of the data processing functions and significantly expands the potentialities and scope of this processing. There arise the possibilities for a more intensive and comprehensive processing of the natural wealth on the basis of continually operating technologies. One of the manifestations of scientific-technical progress is the development and mass utilization of facilities for the treatment and prevention of diseases of man. In addition, by virtue of the system of household machines and instruments, scientific-technical progress has made a fundamental change in the content of household labor and has thus enabled us to increase the amount of free time.

However, in the matter of scientific-technical progress we must not ignore the negative consequences which are a manifestation of its inherent contradictions. In his time F. Engel's made reference to this contradiction. In "The Dialectics of Nature" he wrote: "We will not, however, be too much deluded by our victories. Every such victory takes its revenge upon us. Each of these victories has, it is true, first the consequences we counted

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"on, but in the second and third instance other, unforeseen consequences which very frequently obliterate the significance of the first ones."³

The growth of the scale of production and the intensification of the technological processes are often accompanied by a deterioration of the production environment: increased air temperature and humidity and increased levels of production noise, vibration, dust and gas fumes in the production spaces with adverse effects on the people's health and labor productivity. The negative social consequences of scientific-technical progress are also manifested in increased pollution of the environment (air, water and soil) by the production wastes. Violations of the ecological balance were also noted earlier but because scientific-technical progress proceeded slowly and because the scale of production was relatively small, these violations did not affect the deep-seated processes which take place in nature and they were automatically overcome by nature itself. With the onset of the scientific-technical revolution, the rates and scope of this growth have become so great that, without help from man, nature of itself is unable to overcome the violations of the ecological balance.

The socialist society, which is based on public ownership of the means of production and the natural resources and which develops in systematic fashion, has all the potentialities for implementation of the positive and expeditious prevention of the negative social consequences of the use of new technology. At the 25th CPSU Congress L. I. Brezhnev made this statement: "We, the communists, are proceeding from the thesis that only in the context of socialism does the scientific-technical revolution acquire the correct orientation, one which is responsive to the needs of man and society. In turn, only on the basis of accelerated development of science and technology can the problems of the social revolution be resolved and a communist society built."

The nature of the socialist society encompasses the possibility of foreseeing and on a planned basis preventing the negative social results of scientific-technical progress. The Communist Party and the Soviet government are doing a great deal to achieve this. In the 1971-1977 period the expenditures of the state and the enterprises for labor safety and improvement of labor conditions amounted to 12.4 billion rubles. In 15 years (1960-1975) capital investments for labor safety techniques and production sanitation increased more than 2.5-fold per 1000 workers. In the 10th Five-Year Plan 11 billion rubles are allocated for the implementation of environmental protection measures and the overall amount of capital investments for protection of nature (including the centralized sources of financing) will reach 25 billion rubles. This, in particular, will enable us by 1981 to cut almost in half the amount of the discharges of industrial dust and hydrocarbon into the atmosphere. The first two years of the 10th Five-Year Plan saw the fulfillment of a considerable volume of work for protection of the water basins of the Black, Azov and Baltic seas and the Volga, Ural and Tom rivers. We are expanding the construction of purification installations and circulating water supply systems.

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However, the available resources are not being used in full measure. A large proportion of these resources is being used not for prevention of negative social results but for elimination of them or compensation for them. Thus, of the total expenditures for improvement of the conditions of labor approximately one-third is expended for the prevention of unfavorable conditions and two-thirds for benefits and compensation for work under these conditions. The tasks of preventing and eliminating the unfavorable consequences of the use of the technology impose a number of requirements on all the participants in the process of development and introduction of new technology and on the agencies which formulate technical policy in the country and control the conditions of labor, the status of the environment and the quality of the equipment. We must first of all expand and improve the work of preparing scientifically valid social standards regulating the conditions of labor and the condition of the environment.

In our country we are already working on the establishment of such standards and norms. Thus, in the 10th Five-Year Plan 140 scientific research institutes are engaged in the preparation of standards of environmental quality. Currently 19 of these standards have been approved. More than 500 institutes in the country are compiling norms for labor conditions; they have prepared a number of state normative documents regulating the conditions of labor and the application of labor safety techniques at the operating and newly inaugurated enterprises. Many of these norms have been approved. But in compiling some of the standards they have failed to take into account the technical possibilities for observance and consequently the introduction of these standards has not been accompanied by provision of the appropriate equipment. This resulted from the fact that they were compiled not by complete brigades but only by physiologists and hygienists.

Approval of these standards should apparently be preceded by the preparation of norms of expenditures for the implementation of measures for improvement of the conditions of labor and for environmental protection. The costs entailed in achievement of a planned standard and calculated on the basis of these norms should be compared with the losses which society incurs if it should maintain the status quo. On the scale of the national economy and through the combined efforts of the medical people, ecologists, engineers and economists, it is desirable to work out a system of these standards and norms coordinated with the level of development of society's technology and economic potential. These standards and norms should be on a sliding scale, that is, they should be established for a fixed period, as for example five years. As the economic potentialities and the technical facilities for implementation of the norms grow in strength, the norms should be refined so as to strive for standards and norms designed for the creation of labor and environmental conditions which are in no way hazardous to man's health. In the preparation of these standards and norms a decisive role should be played by the representatives of the natural sciences.

Stepping up the social and economic effectiveness of new technology requires a change in the orientation of the work of many scientific-research and planning and design organizations. For a long time the developers of new

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equipment failed in the process of devising it to take sufficient account of the physiological and psychological characteristics of the workers who must use this equipment. Some models of the tractors currently in production, as for example the MTZ-80 and MTZ-82, do not meet the permissible norms for the most important indicators for the tractor operators' labor conditions-- level of noise in the cabin, infiltration of dust and carbon monoxide in it, air temperature, level of low-frequency oscillations, etc.

Such types of industrial equipment in production as drilling machines, chopping, pick and riveting hammers, rammers, concrete packers, combines, hydrofoils, electric motors and large-capacity trucks have been designed without regard for the effect on man's health resulting from the increased vibration which is the causative factor. The defects in a number of types of metallurgical, foundry, forging and heating equipment as well as the technological processes of metallurgical production are causing an extremely high concentration of gas in the production spaces and excessive or inadequate humidity in them. This has an effect on the health of the people and on production.

Now facing the developers of new equipment is the task of intensifying the "process of humanization" of this equipment, that is, adapting it to human use. In this respect the equipment developed must serve a dual purpose-- it must at the same time accomplish the specific technical and economic tasks entailed in the development of production and it must prevent the negative social consequences of the use of the equipment. The economic justifications for the new equipment developed in the scientific research institutes and design bureaus must be converted into social and economic justifications. They must reflect the impact of the equipment being developed on the health of man, the conditions and attractiveness of labor, and the natural environment.

In the plans for the development of science and technology the social and economic effect of the new technology should be approved through the directive procedure and for purposes of monitoring the fulfillment of these plans it is necessary to organize an accurate accounting of the actual extent of this technology. When certifying output according to quality categories it is essential to take into account the parameters which are used for predicting the social consequences of the use of the output. The systems of indicators for evaluation of the technical level of the enterprises must be reinforced by indicators which reflect the social aspects of the technology.

The strengthening of the social orientation of scientific-technical progress is an important step in accomplishing the task of organically blending the achievements of the scientific-technical revolution and the advances of the socialist system of economics.

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2. V. I. Lenin, "Complete Collected Works," Vol 46, p 30.
3. K. Marx and F. Engels, "Works," Vol 20, pp 495-496.

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CAPITAL INVESTMENTS, NEW TECHNOLOGY TO BE EVALUATED BY THE SCIENTIFIC SOVIET

Moscow VOPROSY EKONOMIKI in Russian No 11, Nov 79 pp 154-156

[Article: "The Work of the USSR AN [Academy of Sciences] Scientific Soviet for the Economic Effectiveness of Fixed Capital, Capital Investments and New Technology"]

[Text] In the March 1979 session of the Presidium of AN USSR, at the suggestion of the Social Sciences Section of AN USSR, a discussion was held on the activity of the AN USSR Scientific Soviet for the "Economic Effectiveness of Fixed Capital, Capital Investments and New Technology" (set up in 1975), which carries out and coordinates studies aimed at increasing the effectiveness of capital investments in the USSR national economy. The importance of these studies is indicated by the increase in capital investments in the national economy and the seriousness of the problems entailed in stepping up their effectiveness.

After hearing and discussing the report of the scientific soviet chairman, Academician Comrade Khachaturov, the Presidium of the Academy of Sciences USSR noted that the scientific soviet is taking an active part in solving the problems entailed in increasing the effectiveness and enhancing the utilization of the fixed capital in line with the decisions of the 25th CPSU Congress. There have been regular plenums of the soviet as well as All-Union conferences on the most pressing problems relating to the effectiveness of the capital investments.

On the basis of the fulfillment of the comprehensive studies coordinated by the soviet in the matter of effectiveness of the capital investments, monographs were published on the central problems pertaining to the effectiveness of the capital investments.

The scientific soviet took an active part in the preparation of the comprehensive program of scientific-technical progress and its social and economic consequences in the long term. The studies on the effectiveness of the capital investments are being carried out in line with the basic directions of the scientific-technical progress.

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The AN USSR scientific soviet on the "Economic Effectiveness of the Fixed Capital, Capital Investments and New Technology" organized a group of specialists which prepared a second edition of "Standard Methods of Determining Effectiveness of Capital Investments," which was approved by USSR Gosplan, GKNT [State Committee for Science and Engineering] and Academy of Sciences. On the basis of "Standard Methods" the ministries and departments compiled about 40 industry manuals, which were approved by Gosplan. The methods regulations for determining the effectiveness of capital investments were incorporated in the official "Methodological Directives for the Preparation of the State Plans for Development of the USSR National Economy."

The principles underlying "Standard Methods" were applied in "Methods of Determination and Comparison of the Economic Effectiveness of Capital Investments by the CEMA Countries" and "Methods of Determining the Economic Effectiveness of the Use of New Technology, Inventions and Rationalization Suggestions in the National Economy."

The scientific soviet prepared drafts for the following supplements to "Standard Methods": methods of determining the economic effectiveness of the capital investments allocated for renovation and expansion of the existing production facilities; methods of determining the economic effectiveness of the capital investments allocated for environmental protection measures; methods of determining the social and economic effectiveness of capital investments in the nonproduction sector of the national economy.

Gosplan USSR was the recipient of a summary report on improvement of the methods of evaluating the economic effectiveness of capital investments and fixed capital on the basis of "Standard Methods."

The scientific soviet prepared the following extremely important suggestions:

--Improvement of the planning of capital investments, maintenance of stability of the five-year plans of capital construction, reduction of the number of installations constructed simultaneously and bringing them into accord with the capacities of the construction organizations, concentration of the capital investments in the underway projects, comprehensiveness in the planning of the capital investments, planning based on the existing industrial centers, and use of program-oriented methods;

--Improvement of the system of economic incentive, discontinuance of evaluation of the construction plan fulfillment on the basis of the volume of fulfilled work (based on expenditures of material, labor and monetary resources) and completion of the change to evaluation based on delivery of the constructed installation to the customer ("turning over the key"); substantial strengthening of long-term credit for construction instead of the irretrievable financing and credit extended to the construction organizations for the period up to the completion of construction and settlement with the customer;

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--Reduction of the estimate cost and materials expended in construction, review of the construction valuation indicators in a way that will not dispose the planning and construction organizations to step up the cost of construction by using expensive and heavy materials; encouraging the use of light-weight materials, plastic and steel flooring for building coverings, hollow brick, etc.;

--Planning and accomplishment of work on renovation of enterprises, with provision for the periodicity of operations in combination with capital repair work, the use of special construction machines designed for operation under the conditions of current production;

--Participation of the machine-building ministries and enterprises in the installation of equipment in projects of construction and renovation (master installation) with final settlement after the enterprise starts operation;

--Improvement of the work of the planning organizations, use of standard plans, reduction of the amount of planning and estimate documentation; inclusion of a number of planning organizations in the production associations and large construction organizations; establishment of complete engineering and construction organizations;

--Widespread proliferation of advanced methods of planning and fulfillment of construction work (the Belorussian and Orlovskiy construction workers, the brigade contract of N. Zlobin, etc.) and economic and moral incentive for the dissemination of advanced methods.

The suggestions of the scientific soviet were submitted to Gosplan USSR in the form of collated generalizing reports on ways of stepping up the effectiveness of capital investments and intensifying the use of fixed capital. The reports were approved by Gosplan and were used in drawing up the five-year plans for development of the national economy and compiling forecasts for the long term.

In its decree the Presidium of the USSR Academy of Sciences approved the work of the AN USSR scientific soviet for "Economic Effectiveness of Fixed Capital, Capital Investments and New Technology" during the period under review.

The decree took note of the fact that there are a number of deficiencies in the work of the soviet. To eliminate them, it recommended that more attention be focused on discussion of the general theoretical problems pertaining to determination of the effectiveness of capital investments and fixed capital, that more emphasis be placed on the training for generalizing work on the theory and practice of achieving effectiveness of capital investments and fixed capital, and that the development of methodological subjects be intensified, particularly methods of evaluating the yield on capital with special attention to the setting up of a more uniform approach

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to evaluation of the economic effectiveness of the capital investments in various industries.

The Presidium of AN USSR believes it necessary to strengthen the links between the scientific soviet and the organizations which are directly concerned with the planning and financing of construction production--Gosplan, Gosstroy and Stroybank [All-Union Bank for the Financing of Capital Investments] USSR and the construction ministries which exercise control over the organs of the largest construction projects. It is necessary for the bureaus and plenums of the soviet to regularly review the subjects of improvement of the planning, financing and organization of construction, the regulation of price-fixing in construction, and the measures to prevent unwarranted increases of these prices. These problems should be studied by the soviet and the local institutions which coordinate with it. It is also necessary to prepare thoroughly substantiated estimates and suggestions for increasing the effectiveness of capital investments and improving construction production; these suggestions had been studied and coordinated with the scientific soviet of the scientific research organizations.

The scientific soviet, its branches and the scientific institutions coordinated with it are advised to carry out a systematic analysis of the actual effectiveness of the capital investments and capital construction on an industry, regional and individual large installation basis. With this in mind, the preparation of the coordinated plans should include the organization of research on the subject of the actual effectiveness along with analysis not only of the progress and results of the construction but also of the utilization of the capacities and organization of the production and labor in the new and renovated enterprises. It is also necessary to give special attention to analysis and investigation of the causes of the high cost and lengthy time periods for capital construction and to offer well-founded suggestions for elimination of these causes; also, to study on a broader scale the problems entailed in the introduction of new materials in construction production.

The scientific soviet is charged with the duty of carrying out productive work for expansion of the practical application of the methods and recommendations prepared by it, to study the results of the introduction of these methods and recommendations, and to devise measures for elimination of the deficiencies found in this work. Particular attention must be focused on the putting into practice of measures to promote increased effectiveness of the capital investments, especially in the various machine-building industries.

The economics department of AN USSR has been directed to intensify its attention to the work on problems of the effectiveness of capital investments. The Institute of Economics, the Institute of Social and Economic Problems, the Central Economics and Mathematical Institute, the Institute of World Economics and International Relations, and the Institute of the Economics of the World Socialist System of AN USSR were advised to expand

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in their research work the plans for the problem studies pertaining to increase of the effectiveness of capital investments.

The soviet must more actively enlist the economics institutes of the academies of sciences of the Union republics for participation in the solution of the problems entailed in increasing the effectiveness of capital investments.

It is necessary for the scientific soviet to implement a number of measures for improvement of "Standard Methods of Determining the Economic Effectiveness of Capital Investments."

--It must complete the revision of "Methods of Determining the Social and Economic Effectiveness of Capital Investments in the Nonproduction Sector of the National Economy" and "Methods of Determining the Economic Effectiveness of Capital investments for the Renovation and Expansion of Current Production";

--It must prepare drafts for methods of determining the effectiveness of capital investments for the implementation of major comprehensive investment programs, the development of sectors of the national economy infrastructure, the development of industrial centers, and the construction of installations in collaboration with the CEMA countries;

It must revise, in keeping with current requirements, "The Basic Methodological Tenets for Determination of the Effectiveness of Scientific Research Work."

The scientific soviet is instructed to prepare a report for submission to Gosplan, Gosstroy and Stroybank USSR concerning ways to increase the effectiveness of capital investments and fixed capital in the 11th Five-Year Plan.

It is also necessary to strengthen the overall methodological supervision of the work done by the planning and administrative organs for the compilation of various methodological documents and regulations pertaining to the analysis and calculation of the effectiveness of fixed capital and capital investments. Also necessary is the strengthening of control over the progress of research carried out by the affiliates and institutes.

The decree took note of the vigorous activity of a number of the affiliates of the scientific soviet, particularly the Leningrad, Ural'sk, Tadzhik and Bashkir affiliates; approval was given for the scientific meetings and conferences to be held by the soviet at the sites.

Control over the fulfillment of the decree was assigned to the Social Sciences Section of the Presidium of AN USSR.

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PROBLEMS OF UTILIZATION OF REGIONAL NATURAL ENVIRONMENT

Moscow VOPROSY EKONOMIKI in Russian No 11, Nov 79 pp 53-60

[Article by F. Martynov, Novokuznetsk: "Methodological Problems of Utilization of Regional Natural Environment"]

[Text] An improvement in the efficiency of social production, recognized as an important trend in the implementation of the party's economic strategy, as noted during the 25th CPSU Congress, is dependent to a considerable degree upon solutions being obtained for the tasks concerned with utilization of the regional natural environment. This derives from the fact that the natural environment is both a source and a storehouse for tremendous, but not unlimited, supplies of mineral raw materials and organic fuel. Thus these resources must be utilized in a purposeful and thrifty manner. In addition, the health and level of material well-being of both the present and future generations are dependent upon the status of the natural environment.

Great importance is being attached to the problems of utilization of regional natural environment from a regional standpoint. This is conditioned by the fact that production, during the course of which an exchange of substances takes place between nature and society, is organized according to both the branch and territorial principle. The urgent nature of the problem of utilization of regional natural environment was noted in the resolution of the CPSU Central Committee and the USSR Council of Ministers entitled "Additional Measures for Further Protecting Nature and Improving the Utilization of Natural Resources"¹.

The territorial organization of social production provides the basis for singling out unique ecological systems (ecosystems). An ecosystem appears as an intimate organic interrelationship of animate (biotic associations) and inanimate (abiotic environment) components of nature. Each one of these components influences the others and on the whole they are all required for "the maintenance of life in the form in which it exists on earth"². The limits of an ecosystem can be outlined within the framework of a TPK [territorial'no-proizvodstvennyy kompleks; territorial production complex],

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PU [promyshlennyy uzel; industrial terminal], IAK [industrial'no-agrarnyy kompleks; industrial agrarian complex] and so forth; local ecosystems can also be singled out. In relation to one another, they all appear as macro and micro ecosystems.

Ecosystems are subjected to the effects of human society. Some of the more important of these effects are those of a production nature, which presently are of a scale that threatens to disrupt the ecological balance. Foreign practice testifies to the fact that critical ecological situations and shortages in natural resources usually arise in the ecosystems of regions marked by a raised economic density³. The ecological workload in such regions often reaches a maximum high level, as a result of which the natural environment proves to be incapable of filtering through and neutralizing the economic-domestic waste products and refuse. The so-called "critical regions" of developed capitalist countries serve as examples of such ecosystems. The natural balance has been disrupted in these regions and thus the health of the population is seriously threatened. Thus the largest rivers of Western Europe -- the Rhine, Seine, Marne and others -- resemble open sewage. The American Great Lakes, in the opinion of scientists, are threatened by biological death. In Tokyo, for example, there have already been incidents of mass poisoning of the population by smog⁴. The reasons for this lack of control over the ecological situation and the formation of "critical regions" in capitalist countries derive from the very nature of the particular system, one which defines the predatory nature of capitalist utilization of nature.

The utilization of nature is basically different under socialism, owing to public ownership of the means of production. This precludes the possibility of such "critical regions" developing under socialism and yet it does not eliminate the problem of utilization of regional natural environment: first of all, rapid growth in the country's economic potential is resulting in more intensive utilization of natural resources; secondly, individual economic regions and macro and micro ecosystems are marked by a stable trend towards accelerated growth in economic density and, it follows, towards an increase in their ecological workload; thirdly, the mastering of the new regions in western and eastern Siberia and the Far North require preliminary ecological-economic validation for the operation of deposits and for improving the quality of the life support system.

In our opinion, the solving of the problem of utilization of regional natural environment requires a classification of economic regions according to their natural-production characteristics. Moreover, for each one of them and also for individual TPK's, PU's, IAK's and so forth, it would be advisable to compose an ecological-economic certificate containing a number of ecological-economic recommendations and an exhaustive natural-geographic and production description of a particular region (natural-climatic features of the region, its geographical position, landscape arrangement, availability of natural resources, production profile and so forth). The ecological-economic recommendations should formulate a long-range plan for

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the particular region, TPK, PU, or IAK, taking into account the overall regional and national peculiarities, they should determine the degree of stability of the macro and micro ecosystem with regard to the production effects imposed upon it and they must establish the permissible limits for such effects, so as to ensure an optimum ratio for economic growth and ecological balance, that is, the very essence of the problem concerned with making proper use of nature. If a preference is shown for one of the sides, for example economic development, then sooner or later a requirement will develop for working out ecological problems. And conversely, the converting of the task concerned with protecting the surrounding environment into an end in itself could negate the role played by the natural factor in productive processes and bring about an artificial deficit in raw material resources.

In connection with the trend towards a change in the territorial structure of social production, the economic potential in regions to the east of the Urals Chain is growing at an accelerated tempo. For example, during the 1940-1975 period the overall volume of industrial output for the country as a whole increased by a factor of 17, in the western Siberian economic region -- 31, in Kazakhstan (Kazakh SSR) -- 27 and in the eastern Siberian economic region -- by a factor of 23. During the years of the Ninth Five-Year Plan, USSR industry on the whole increased by 143 percent and in the eastern regions -- by 146 percent. The plans for this current five-year period call for the volume of industrial production in these regions, particularly in Siberia, to be increased by a factor of 1.5⁵.

At first glance it might seem that an increase in economic density in these regions, with their vast territories and mineral wealth, may not result in a substantial disruption in the ecological balance or in depletion of the valuable types of material raw materials or organic fuel. However, the ecological workload is distributed in these regions in an irregular manner. In some regions (macro and micro ecosystems) where branches which contaminate the environment to a high degree have undergone preferred development, this workload reaches a very high level and the development of minerals does not achieve rational norms. In addition, the restorative capability of ecosystems in the eastern regions, which are distinguished by extreme natural conditions (deficit of heat, permafrost, excess moisture, minimum duration of activity of flora and so forth), is extremely limited⁶.

In the near future, the production-raw material trend in the eastern regions will be augmented by the development of such processing branches as the petroleum refining and chemical industry, ferrous metallurgy, production of aluminum, mineral fertilizers, machine-building for the production of machines for use in the north⁷. But it must be borne in mind that although the close proximity of the processing branches to the raw material sources meets the requirements for the complex development of socialist production, it tends at the same time to intensify the ecological workload on the macro and micro systems.

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The formation of an entire series of large TPK's, PU's and other territorial-production associations is continuing at the present time in western and eastern Siberia, the Far North and in the far eastern economic region: West-Siberian TPK based upon Tyumen' petroleum and gas, multi-profile Kuzbass TPK, Sayanskiy TPK with the formation in it of the Abakan, Minusinsk, Oznachensk industrial terminals, the Bratsk-Ust'-Ilinskiy TPK, the Noril'sk TPK for the production of non-ferrous metals, the system of Angaro-Yeniseysk TPK's, several TPK's in the zone of BAM [Baykal-Amur Trunk Line] and so forth⁸.

The Kuzbass TPK is deserving of proper attention. This year it is playing an important role in connection with implementing the large-scale regional programs outlined by the party. Industrial production in the Kuznetsk Coal Basin today accounts for more than 90 percent of the oblast's products being exported to more than 60 countries throughout the world. In the future, the Kuznetsk Coal Basin will retain its importance as the foundation for the metallurgical base in the eastern part of the country. By the end of the 10th Five-Year Plan, enterprises of the coal industry of the Kuzbass TPK will account for 47.5 percent of the overall increase in coal production in the RSFSR and more than 23 percent in the USSR. There will be a stable trend towards an increase in the production of products of the chemical and power engineering branches.

Further development and the increasing role played by the Kuzbass TPK in inter-regional division of labor will raise a task with regard to a comprehensive analysis of its functioning from an ecological-economic standpoint. A large number of enterprises of the Kuzbass TPK operate within the boundaries of Kemerovskaya Oblast. Taking into account the force of the production effect generated on the surrounding environment in the ecosystem of the Kuznetsk Coal Basin, it bears mentioning that the problems concerned with the utilization of nature here are particularly urgent.

First of all, the Kuzbass TPK is distinguished by a raised economic density. Although it occupies only 4 percent of the territory of the western Siberian economic region, its industrial enterprises produce one third of all products being produced in the region.

Second, the production specialization of the complex is represented by branches which acquire the greatest percentage of mechanic and technological pressure for the ecosystem. Thus the profiling branches of the Kuzbass TPK (fuel industry, ferrous metallurgy, chemical and power engineering industry and machine-building) account for 85 percent of all of the industrial-productive fixed capital of the Kuzbass TPK, while the enterprises of these branches produce almost 74 percent of all industrial output on the whole.

Third, the Kuznetsk Coal Basin imposes a high level of demographic pressure on the region's ecosystem¹⁰. The population density here is 31 persons per square kilometer and this exceeds the all-union figure by twofold. Moreover, the municipal population (86 percent) predominates; more than one half of

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this population is concentrated in large cities: Novokuznetsk, Kemerova, Prokop'yevsk and others, constituting large municipal agglomerations¹¹. The high level of demographic pressure imposes raised requirements on the ecological-hygienic and recreational conditions of the life-support system.

The latter factor is of special importance with regard to the ecological-economic basis for further development of the Kuzbass TPK. This is explained by the fact that the essence of nature utilization cannot be reduced to a system or complex of interrelationships between man and nature, which arise directly during the course of his labor activities¹². Man is a part of nature, which provides him with a permanent living environment. Thus, protection of the surrounding natural environment and the reproduction of those ecological-hygienic and recreational factors which promote the protection and development of human health as the main productive force of society, together with the proper utilization of raw material resources, represent a component part of socialist utilization of nature.

The creation of the required ecological-hygienic and recreational conditions of a life-support system for a particular region requires definition of the specific components of its microsystems, taking into account the mechanical, technological and demographic pressure on the ecosystem. An attempt is being made at the present time to classify the territory of the Kuzbass TPK according to the degree of contamination of the air basin of individual regions. In accordance with this classification, three regions and eight sub-regions having differing degrees of atmospheric contamination are being singled out. The microsystems of the central and southern parts of the territory of the Kuzbass TPK¹³ are the most favorable in this regard.

We are of the opinion that such a classification of microsystems does not serve to describe them fully from an ecological-economic standpoint. First of all, the prepared plan for contamination of the region's air basin was extremely conditional, since the central concentration in it of anthropogenic substances moves to a territory several hundreds of kilometers distant. Secondly, the authors of this classification take into account only one technogenic factor -- the degree of contamination of atmospheric air which precludes the possibility of presenting a complete picture on the functioning of an ecosystem. In turn, this eliminates the possibility of determining the socio-economic damage inflicted or of creating the ecological-hygienic and recreation conditions required for a life support system.

Based upon the above, we are of the opinion that a fully complete description of a microsystem must include a complex of technogenic factors and also the degree of demographic pressure imposed on the ecosystem.

By taking into account the nature of the effect of national economic branches on the surrounding environment and also intra-territorial social division of labor and population density, it is possible, based upon objective data, to compose a map-plan (mapping) for a micro-ecosystem in accordance with the ecological-economic functional dependence. The availability of such a

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map-plan will make it possible to commence solving specific tasks: determine the degree and permissible limits or norms for the technogenic influence upon a micro-ecosystem; disclose the damage inflicted upon the surrounding environment, taking into account the losses caused by incapacitation of the population as a result of unsatisfactory ecological-hygienic conditions; define and plan measures and capital investments aimed at sanitizing the surrounding environment and creating ecological-hygienic and recreation conditions for a self-support system in a particular micro-ecosystem.

We believe that the following steps must be taken in order to solve these tasks. Based upon data supplied by the planning organs, a forecast must be prepared for the development of the national economic branches and for growth in overall output volume for a definite period of time. On the basis of such a forecast, the specialists (economists, ecologists, technologists, agronomist-soil scientists, medical specialists) take into account and compute the permissible level of technogenic effect on the ecosystem and also the possible damage to be sustained. Consideration is also given to those losses associated with incapacitation of the population as a result of unsatisfactory ecological-hygienic conditions, including sick leave payments and the value attached to underproduction. A predicted demographic situation, taking into account the natural and mechanical movement of the population, will make it possible to establish the demographic pressure on the ecosystem and the recreation measures required.

In summary, this will make it possible to forecast the possible socio-economic damage to be caused by the technogenic effect on the surrounding environment, the need for ecological-hygienic and recreational measures and, accordingly, to convert over to the planning of measures and capital investments aimed at eliminating the negative consequences of utilization of nature and the introduction of rational and scientifically sound norms for such utilization.

The distinct nature of ecological systems (micro-ecosystems), in terms of their ecological-economic functional dependence, excludes use of the conventional approach in solving the tasks concerned with the utilization of nature. Great importance is attached here to employing a complex and, at the same time, differentiated approach and also to the element of timeliness in implementing the measures aimed at protecting nature. For example, of all of the micro-ecosystems which are joined together by relatively common natural conditions and by the single production specialty of the Kuzbass TPK, it is possible to single out the micro-ecosystem of the southwest portion of the region, consisting of an agglomeration of cities (Novokuznetsk, Prokop'yevsk, Kiselevsk), and its adjoining territory. One feature of this region (micro-ecosystem) is the fact that practically all ferrous metallurgy, a large number of enterprises of the non-ferrous and fuel-power engineering (coal) industry and enterprises of machine-building, metal-processing, transport and so forth, are concentrated here. Within the boundaries for this micro-ecosystem, the level of technical effect exceeds

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this same index for other micro-ecosystems in the Kuznetsk Coal Basin. Thus, according to data obtained from Novosibroskoprozem, of all of the land in Kemerovskaya Oblast used for coal-mining purposes during the 1948-1972 period, 15,903 hectares or more than 47 percent is found in the southwestern part (micro-ecosystem) of the Kuzbass TPK. An extended period of restoration is required for 38 percent of this land.

Powerful enterprises of ferrous and non-ferrous metallurgy, enrichment factories, dumps and waste piles, all of which contain millions of tons of waste rock that is capable of self-ignition, even when the coal content is minimal, enterprises of the construction materials and power engineering industries, constant increases in motor vehicle pools and so forth, appear as the principal sources of contamination of the air basin not only for municipal agglomerations but nearby territories as well. According to computations carried out at NNISI [Novosibirskiy nauchno-issledovatel'skiy sanitarnyy institut; Novosibirsk Scientific-Research Sanitary Institute], a tremendous accumulation of dust and soot formations in the atmosphere lowers the integral flow of solar radiation above Novokuznetsk, for example, by up to 40 percent and more¹⁴.

Studies carried out at the institute have shown that the principal river of the Kuznetsk Coal Basin, the Tom' River, as well as its tributaries and small bodies of water along its length, for all practical purposes cannot be used for a centralized water supply system unless the water is purified in advance¹⁵.

The level of the technogenic effect on the micro-ecosystem of the southwest part of the Kuzbass TPK will increase in the immediate future. Thus, according to data for the oblast plan, of the volume of construction-installation work of a productive nature planned for the end of the Tenth Five-Year Plan, more than 40 percent will be carried out on the territory of this micro-ecosystem. Moreover, it should be borne in mind that 32 percent of the overall population and 36 percent of the oblast's municipal population are concentrated in the southwestern agglomeration of cities of the Kuzbass TPK¹⁶.

Hence, the specific nature of the micro-ecosystem for the southwestern part of the Kuzbass TPK requires operational measures: first of all, for cleansing the air basin of cities; secondly, for the extensive implementation of recultivation work; thirdly, for preparing and organizing recreational sites and measures for mass recreational purposes of both long and short-term duration.

Another and equally important aspect of the problem of utilization of regional natural environment is that of the development and utilization of raw material resources. In the Kuznetsk Coal Basin at the present time, similar to throughout the country as a whole, the extraction of iron ore and coal using the open-pit method is developing at a rapid tempo. However, at times the positive aspects of this method result in the state sustaining

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considerable material losses. For example, only veins of great thickness are being worked at coal mines in the basin. Veins which range in thickness from 2.5 to 3 meters are not being worked and are being classified as so-called "losses," despite the fact that norms have been adopted for open-pit work according to which the development of vein deposits is mandatory when the thickness of the vein is 1.5-2 meters. In addition, there are practically no enrichment factories at the open-pit workings and, as a result, up to three million tons of coal are being consigned to the dump, together with rock, and lost annually¹⁷.

In addition to the losses in coal, which at one and the same time is fuel and a valuable raw material for the chemical industry, the development of vein deposits using the open-cut method results in the removal from operation of large areas of land and agricultural fields. Moreover, agriculture receives back only a miserly portion of the restored areas. The fertile and rich with humus upper layer of soil, which could be used in the recultivation of the worked lands, is destroyed for the most part¹⁸.

Another example of the irrational utilization of natural resources is associated with the extraction, production and processing of raw materials, semi-finished goods and also industrial residues and waste products at metallurgical enterprises throughout the oblast. The incomplete use of the ores extracted and violations of the enrichment technology result in losses not only with regard to this raw material that is used directly in ferrous metallurgy but also in the associated and non-extracted components (for example, zinc, cobalt, magnesium, various non-metallic materials and so forth). According to computations carried out at the Western Siberian Geological Administration, up to 300 tons of cobalt -- a most valuable and rare raw material used in non-ferrous metallurgy -- are being lost annually at the present time at non-ferrous metallurgy enterprises in the Kuznetsk Coal Basin. As the result of a simplified technology for the combined enrichment of purely magnetite and semi-oxidized ores, the losses in so-called "tailings" range at times from 15 to 18 percent.

Incidents involving the direct use of high-iron ores (having an iron content of no less than 45 percent) are being tolerated by some enrichment factories. With the enrichment stage eliminated, this ore, following the usual crushing, is merged with a general flow of magnetic ores containing a lower percentage of iron and this increases the raw material losses. In the final analysis, hundreds of thousands of tons of unused iron ore end up in the dumps of the enrichment factories.

An important and as yet unsolved national economic task of the Kuznetsk Coal Basin is that of utilizing the industrial waste products and refuse of secondary raw materials, the use of which makes the industrial waste and refuse into by-products which are on a par with the primary raw materials and elements of the production process. The practical results realized from the utilization of secondary raw materials lead to a savings in raw materials, an expansion of the raw material base for a number of branches

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and production efforts, a reduction in production costs for the principal production effort and the elimination of the harmful effects of certain types of industrial waste products on the surrounding environment (for example, metallurgical blast furnace sludge). The sludge waste products appear as blast furnace charge carried away by gases. According to the data of specialists, blast furnace slag is enriched 10-12 percent by zinc and also by certain trace elements (indium, cadmium, gallium). Over a period of many years of continuous blast furnace fusions at the old ferrous metallurgy enterprise of the Kuzbass-Kuznetsk Metallurgical Combine, an accumulation developed of hundreds of thousands of tons of sludge, which lies as a dead weight and which poisons the micro-ecosystem of the combine. The elimination of iron ore losses, owing to its complete utilization, the observance of technological enrichment discipline and the utilization of sludge and refuse at ferrous metallurgy enterprises throughout the oblast will make it possible to provide the country's metallurgical industry with 1,000 additional tons of zinc concentrate, a considerable quantity of cobalt and rare elements and also additional raw materials for the production of sulphuric acid, construction materials and so forth.

Tremendous reserves of diverse types of non-metallic minerals are available on the territory of the Kuzbass TPK. However, unjustified losses are tolerated during the course of developing these reserves. For example, the losses at open-cut mines of Glavkuzbasstroy of the RSFSR Ministry of Construction amount to 25 percent, compared to only 5 percent according to the planning-research norms. At a large number of the open-cut mines the sandy-gravel mixture is extracted not on the basis of a fully proven layer for this raw material, but rather on a selective basis; as a result, large proven reserves of construction materials remain abandoned.

Thus the unfavorable ecological situation existing in this region is not so much the result of highly developed industry in the Kuznetsk Coal Basin, but rather it derives from the violations that are tolerated in the technological discipline for the production processes. The complex and rational use of the mineral reserves and the utilization of industrial waste products and refuse would ensure an expansion of the raw material base for industrial production and prevent contamination of the surrounding environment.

Included among the more important and effective measures for protecting the surrounding environment and ensuring the rational utilization of a region's natural resources are the establishment and evaluation of its ecosystem according to its natural-productive characteristics and the introduction of ecological-economic recommendations for the further development of production; singling out of micro-ecosystems and local temporary uncontrolled ecological situations, involving their mandatory mapping and the introduction of an ASU [automatic control system] for operational observance and control over the status of the air and water basins; determining specific trends for achieving an ecological balance in a given region, recreational measures,

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and the rational utilization and reproduction of its natural resources, based upon the principles of a complex and, at the same time, differentiated approach towards solving the tasks of socialist utilization of nature.

However, measures aimed at protecting nature must not restrain the development of production in a particular region. To the contrary, they must promote the comprehensive and harmonious development of production and an intensification in the rates of growth for socialist production.

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